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REMARKS

Claims 1-32 are pending in the application. Claims 14-19, 23, 26, and 28-30 are withdrawn from consideration. Claims 1-10, 12, 13, 20-22, 24, 25, 31, and 32 are rejected. Claims 11 and 27 are objected to.

In the Office Action, the Examiner rejected claims 1-2, 4, 7-8, 12-13, 22, 24-25, and 31-32 pursuant to 35 U.S.C. § 102(b) as being anticipated by Chiang et al. (U.S. Patent No. 5,590,658). Claims 3, 5-6, 9, and 20-21 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Chiang et al. in view of Jeong (U.S. Patent No. 6,658,141). Claim 10 was rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Chiang et al. in view of Ossmann et al. (U.S. Patent No. 6,527,723). Claims 11 and 27 were objected to as allowable if amended.

Claims 1, 3-7, 9-11, 13, 20-22, and 25 have been amended. Claims 2, 14-19, 23-24, and 26-30 have been cancelled. Applicants respectfully request reconsideration of the rejections of claims 1-10, 12, 13, 20-22, 24, 25, 31, and 32, including independent claims 1, 22, 25, and 31.

Independent claim 1 recites determining a grating lobe level as a function of a filter input and output, and automatically altering processing in response to the grating lobe level. Chiang et al. do not disclose these limitations. Chiang et al. use adaptive beamforming to suppress artifacts due to scattering and clutter in side lobes (col. 15, lines 47-55). Multiplier weights for a FIR filter are controlled in a feedback loop (col. 16, lines 2-6 and Figure 12). The weights are applied to channel data, and the weighted channel data is summed (col. 16, lines 18-22). The summed signal is analyzed to control the weights (Col. 16, lines 22-37). Chiang et al. disclose detecting clutter, interference or side lobe effects in the summed signals (col. 16, lines 25-27). Chiang et al. use the output of the filter. Applicants respectfully submit that there is no suggestion to determine a grating lobe level as a function of the filter output and input.

Independent claim 22 recites a processor operable to determine a level of grating lobe clutter as a function of input and output data, and to alter processing in response to the level of grating lobe clutter. As discussed above, Chiang et al. do not disclose these limitations.

Independent claim 25 has been amended to include all of the limitations of claim 27. Because claim 27 is allowable, claim 25 should be allowed.

Independent claim 31 recites axially processing ultrasound data and adapting data processes as a function of the axial processing to reduce grating lobe energy in the data. Chiang et al. generate beam sums with an FIR filter. Each beam sum is formed from channel data at a given depth. The beamformation process is not an axial process.

Dependent claims 3-13, 20, 21, and 32 depend from the independent base claims 1 and 31, and are thus allowable for at least the same reasons as the corresponding independent base claim. Further limitations of the dependent claims distinguish from Chiang et al. For example, claim 4 recites filtering prior to channel summation. Chiang et al. filter with channel summation. Claim 7 recites outputting a weighted summation of the input and output to the filter. Chiang et al. sum the channel data as part of filtering, but do not sum the input and output to the filter. Claim 13 recites varying determining grating lobe or altering processing as a function of steering angle or range. Chiang et al. disclose beamforming which varies delays as a function of angle or range, but do not disclose varying the FIR filtering as a function of angle or range. Claim 32 recites axial filtering. Because Chiang et al. filter across channels, there is no disclosure of axial filtering.

For dependent claims 3, 5-6, 9, and 20-21, Applicants respectfully submit that a person of ordinary skill in the art would not use the filtering after beamforming of Jeong as part of the process of Chiang et al. Chiang et al. rely on a channel summation process. Processing after beamformation of Jeong would not have been used in Chiang et al.

Jeong and Chiang et al. do not disclose limitations of these dependent claims. For example, claim 5 recites a difference of filter input and output. Jeong does not use both the filter input and output (see equations 21 and 22), and thus does not provide the difference. Claim 6 is allowable for a similar reason. Claim 9 recites weights of 0 and 1 or 1 and 0. Jeong does not disclose absolute weights.

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CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

PLEASE MAIL CORRESPONDENCE TO:

Siemens Corporation
Customer No. 28524
Attn: Elsa Keller, Legal Administrator
170 Wood Avenue South
Iselin, NJ 08830

Respectfully submitted,



Peter Lam, Reg. No. 44,855
Attorney(s) for Applicant(s)
Telephone: 650-943-7350
Date: 11/23/05